General

Guideline Title

Esotropia and exotropia.

Bibliographic Source(s)

American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Esotropia and exotropia. San Francisco (CA): American Academy of Ophthalmology; 2012. 44 p. [229 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Esotropia and exotropia. San Francisco (CA): American Academy of Ophthalmology; 2007. 34 p.

All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all Preferred Practice Patterns are current, each is valid for 5 years from the "approved by" date unless superseded by a revision.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): A full description of the Care Process is provided in the original guideline document.

Ratings of the strength of the recommendations (Strong, Discretionary) and quality of evidence (Good, Moderate, Insufficient) are defined at the end of the "Major Recommendations" field.

Esotropia

Disease Definition

Infantile Esotropia

Infantile esotropia and exotropia are associated with an increased risk of amblyopia. *(Good evidence)*

Background

Natural History

Strabismus in children under 4 months of age sometimes resolves, particularly if the deviation is intermittent, or variable, or measures less than 40

prism diopters. *(Good evidence)*

Rationale for Treatment

Children with untreated strabismus can have reduced binocular potential and impaired social interactions, and they can be subject to negative perceptions by others, which may affect their psychosocial quality of life. *(Good evidence)*

Care Process

Examination

Visual Acuity

The choice and arrangement of optotypes (letters, numbers, symbols) on an eye chart can significantly affect the visual acuity score obtained. Preferred optotypes are standardized and validated. *(Strong recommendation, Good evidence)*

Vision testing with single optotypes is likely to overestimate visual acuity in a patient with amblyopia. A more accurate assessment of monocular visual acuity is obtained with the presentation of a line of optotypes or a single optotype with crowding bars that surround (or crowd) the optotype being identified. *(Strong recommendation, Good evidence)*

Management

Correction of Refractive Errors

Table. Guidelines for Refractive Correction in Infants and Young Children

Condition	Refractive Errors (Diopters)		
	Age <1 Year	Age 1–2 Years	Age 2–3 Years
Isoametropia (similar refractive error in both eyes)			
Myopia	–5.00 or more	–4.00 or more	–3.00 or more
Hyperopia (no manifest deviation)	+6.00 or more	+5.00 or more	+4.50 or more
Hyperopia with esotropia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	3.00 or more	2.50 or more	2.00 or more
Anisometropia (without strabismus)*			
Myopia	–4.00 or more	–3.00 or more	–3.00 or more
Hyperopia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	2.50 or more	2.00 or more	2.00 or more

Note: These values were generated by consensus and are based solely on professional experience and clinical impressions because there are no scientifically rigorous published data for guidance. The exact values are unknown and may differ among age groups; they are presented as general guidelines that should be tailored to the individual child. Specific guidelines for older children are not provided because refractive correction is determined by the severity of the refractive error, visual acuity, and visual symptoms.

*Threshold for correction of anisometropia should be lower if the child has strabismus. The values represent the minimum difference in the magnitude of refractive error between eyes that would prompt refractive correction.

Repeat cycloplegic refraction is indicated when esotropia does not respond to the initial prescription of hyperopic refraction or when the esotropia recurs after surgery. *(Strong recommendation, Moderate evidence)*

Exotropia

Disease Definition

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Background

Rationale for Treatment

Children with untreated strabismus can have reduced binocular potential and impaired social interactions, and they can be subject to negative perceptions by others, which may affect their psychosocial quality of life. *(Good evidence)*

Care Process

Management

Young children with intermittent exotropia and good fusional control can be followed without surgery. *(Strong recommendation, Moderate evidence)*

Extraocular Muscle Surgery

In patients with exotropia and a high accommodative convergence to accommodation ratio (AC/A), treatment with eyeglasses is generally preferred over surgery because of the risk of consecutive esotropia and diplopia after surgery. *(Discretionary recommendation, Moderate evidence)*

Follow-up Evaluation

Esotropia that persists after exotropia surgery may place the patient at risk for amblyopia, diplopia, and loss of stereoacuity. *(Moderate evidence)*

Socioeconomic Considerations for Strabismus

Children with untreated strabismus can have reduced binocular potential and impaired social interactions, and they can be subject to negative perceptions by others, which may affect their psychosocial quality of life. *(Good evidence)*

Definitions:

Strength of Recommendation

Strong recommendation Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Body of Evidence Quality Ratings

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

- Esotropia*
- Exotropia

Note: Esotropia is a convergent misalignment of the visual axes; exotropia is a divergent misalignment of the visual axes.

*In this guideline, esotropia is limited to the nonparalytic, nonrestrictive form of the disease with onset in childhood and with minimal or no limitation in range of motion of the eyes.

Guideline Category

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Family Practice

Ophthalmology

Pediatrics

Intended Users

Health Plans

Physicians

Guideline Objective(s)

- To identify children at risk for esotropia or exotropia
- To detect esotropia or exotropia
- To detect and treat amblyopia that may cause, or be caused by, esotropia or be associated with exotropia
- To educate the patient and/or family/caregiver, as appropriate, of the diagnosis, treatment options, and care plan
- To inform the patient's other health providers of the diagnosis and treatment plan
- Treat the esotropia or exotropia (align the visual axes) to promote and maintain binocular vision (fusion, stereopsis), prevent or facilitate treatment of amblyopia, and restore normal appearance
- To maximize quality of life by optimizing binocular alignment and visual acuity
- To monitor vision and binocular alignment and modify therapy as appropriate

Target Population

Patients with childhood-onset esotropia or exotropia

Interventions and Practices Considered

Diagnosis

1. History and risk assessment
2. Comprehensive strabismus examination
    - Assessment of fixation pattern and visual acuity
    - Binocular alignment and motility
    - Extraocular muscle function

- Detection of nystagmus
- Sensory testing
- Cycloplegic retinoscopy/refraction
- Funduscopic examination
- Additional testing

Treatment/Management

1. Choice of therapy
    - Correction of refractive errors
    - Bifocals
    - Prism therapy
    - Amblyopia treatment
    - Extraocular muscle surgery
    - Botulinum toxin A injection
    - Stimulating accommodative convergence
    - Patching (antisuppression) therapy
    - Convergence exercises for convergence insufficiency exotropia
2. Follow-up evaluation
3. Counseling/referral

Major Outcomes Considered

- Binocular motor alignment
- Binocular sensory status (fusion and stereopsis)
- Visual acuity in each eye
- Side effects or complications of treatment

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature searches to update the Preferred Practice Pattern were undertaken in April 2011 in PubMed and the Cochrane Library and updated in March and September of 2012. Complete details of the literature search are available from the American Academy of Ophthalmology Web site .

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence to Rate Individual Studies

I++ High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias

I+ Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

I- Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias

II++ High-quality systematic reviews of case-control or cohort studies

High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

II+ Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

II- Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

III Nonanalytic studies (e.g., case reports, case series)

Body of Evidence Quality Ratings*

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

*Defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE)

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

All studies used to form a recommendation for care are graded for strength of evidence individually, and that grade is listed with the study citation.

To rate individual studies, a scale based on Scottish Intercollegiate Guideline Network (SIGN) is used. The definitions and levels of evidence to rate individual studies are listed in the "Rating Scheme for the Strength of the Evidence" field.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The Pediatric Ophthalmology/Strabismus Preferred Practice Pattern® Panel members wrote the Esotropia and Exotropia Preferred Practice Pattern® guidelines ("PPP"). The PPP Panel members discussed and reviewed successive drafts of the document, meeting in person twice and conducting other review by e-mail discussion, to develop a consensus over the final version of the document.

Rating Scheme for the Strength of the Recommendations

Key recommendations for care are defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE) as follows:

Strong recommendation Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests

that desirable and undesirable effects are closely balanced

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Preferred Practice Patterns Committee members reviewed and discussed the document during a meeting in March 2012. The document was edited in response to the discussion and comments.

The Esotropia and Exotropia Preferred Practice Pattern was then sent for review to additional internal and external groups and individuals in June 2012. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered. Members of the Pediatric Ophthalmology/Strabismus PPP Panel reviewed and discussed these comments and determined revisions to the document.

These guidelines were approved by the Board of Trustees of the American Academy of Ophthalmology (September 15, 2012).

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Esotropia

The potential benefits of treatment for esotropia include promoting binocular vision and normal visual function in each eye. If binocularity is achieved, the number of surgical procedures over a lifetime and overall cost to society may be reduced. Fusion and stereopsis are necessary for some careers and may be useful in others as well, such as in athletic activities and activities of daily life. In addition, binocular alignment is important for the development of a positive self-image and enhances social interactions by normalizing appearance as well as eye contact.

Exotropia

The potential benefits of treatment for exotropia include promoting binocular vision and normal visual function in each eye. Normal binocular alignment promotes a positive self-image. After strabismus surgery, adults have reported improved confidence, self-esteem, and interpersonal interactions.

Potential Harms

Esotropia

- Short-term side effects of cycloplegic and dilating agents may include hypersensitivity reactions, fever, dry mouth, rapid pulse, nausea, vomiting, flushing, and, rarely, behavioral changes.
- Disadvantages of bifocals include expense, appearance, and potential rejection by the child.
- Press-On prisms cause visual symptoms that some children find objectionable (blurred vision with poor compliance with eyeglasses). In addition, using Press-On prisms requires re-evaluation (additional office visits), and may be unacceptable in children not otherwise wearing eyeglasses.
- Disadvantages of botulinum toxin A injection include the frequent need for repeat injection(s), especially with larger preoperative angles; iatrogenic ptosis, which may increase the risk for amblyopia; and the need for general anesthesia.

Exotropia

Extraocular muscle surgery. Treatment with eyeglasses is generally preferred over surgery because of the risk of consecutive esotropia and diplopia after surgery. When the deviation is intermittent, many ophthalmologists defer surgery in young children with fusion to avoid complications associated with postoperative esotropia. These complications include suppression, amblyopia, and loss of binocular vision, particularly stereoacuity.

Qualifying Statements

Qualifying Statements

- Preferred Practice Patterns (PPPs) provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these PPPs will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.
- Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.
- References to certain drugs, instruments, and other products are made for illustrative purposes only and are not intended to constitute an endorsement of such. Such material may include information on applications that are not considered community standard, that reflect indications not included in approved U.S. Food and Drug Administration (FDA) labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Foreign Language Translations

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1992 Feb (revised 2012)

Guideline Developer(s)

American Academy of Ophthalmology - Medical Specialty Society

Source(s) of Funding

Preferred Practice Pattern® guidelines are developed by the Academy's H. Dunbar Hoskins Jr., M.D. Center for Quality Eye Care without any external financial support. Authors and reviewers of the guidelines are volunteers and do not receive any financial compensation for their contributions to the documents.

Guideline Committee

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel; Preferred Practice Patterns Committee

Composition of Group That Authored the Guideline

Members of the Pediatric Ophthalmology/Strabismus Panel 2011-2012: C. Gail Summers, MD (*Chair*); Stephen P. Christiansen, MD; Alex R. Kemper, MD, MPH, MS, American Academy of Pediatrics Representative; Katherine A. Lee, MD, PhD; Graham E. Quinn, MD; Michael X. Repka, MD, MBA; David K. Wallace, MD, MPH, American Association for Pediatric Ophthalmology & Strabismus Representative; Susannah G. Rowe, MD, MPH, Methodologist

Members of the Preferred Practice Patterns Committee: Christopher J. Rapuano, MD (*Chair*); David F. Chang, MD; Robert S. Feder, MD; Stephen D. McLeod, MD; Timothy W. Olsen, MD; Bruce E. Prum, Jr., MD; C. Gail Summers, MD; David C. Musch, PhD, MPH, Methodologist

Financial Disclosures/Conflicts of Interest

In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at www.cmss.org/codeforinteractions.aspx), relevant relationships with industry are listed. The Academy has Relationship with Industry Procedures to comply with the Code (available at http://one.aao.org/CE/PracticeGuidelines/PPP.aspx). A majority (87%) of the members of the Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012 had no financial relationship to disclose.

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012

Stephen P. Christiansen, MD: No financial relationships to disclose
Alex R. Kemper, MD, MPH, MS: No financial relationships to disclose
Katherine A. Lee, MD, PhD: No financial relationships to disclose
Graham E. Quinn, MD: No financial relationships to disclose
Michael X. Repka, MD, MBA: No financial relationships to disclose
Susannah G. Rowe, MD: No financial relationships to disclose
C. Gail Summers, MD: No financial relationships to disclose
David K. Wallace, MD, MPH: Allergan, Inc. – Consultant/Advisor

Preferred Practice Patterns Committee 2012

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David C. Musch, PhD, MPH: No financial relationships to disclose
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The disclosures of relevant relationships to industry of other reviewers of the document from January to August 2012 are available online at www.aao.org/ppp .

Guideline Status

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Guideline Availability

Electronic copies: Available from the American Academy of Ophthalmology (AAO) Web site .

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

Availability of Companion Documents

The following are available:

- Esotropia summary benchmarks for preferred practice pattern® guidelines. San Francisco (CA): American Academy of Ophthalmology; 2012 Oct. 2 p. Electronic copies: Available in Portable Document Format (PDF) in English and other translations from the American Academy of Ophthalmology (AAO) Web site .
- Exotropia summary benchmarks for preferred practice pattern® guidelines. San Francisco (CA): American Academy of Ophthalmology; 2012 Oct. 2 p. Electronic copies: Available in PDF in English and other translations from the American Academy of Ophthalmology (AAO) Web site .

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

Patient Resources

None available

NGC Status

This summary was completed by ECRI on December 1, 1998. The information was verified by the guideline developer on January 11, 1999. This summary was updated on March 12, 2003. The updated information was verified by the guideline developer on April 2, 2003. This NGC summary was updated by ECRI Institute on February 5, 2008. The updated information was verified by the guideline developer on February 27, 2008. This summary was updated by ECRI Institute on February 21, 2012.

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